ROYAL ASTRONOMICAL SOCIETY.

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CAPT. W. H. SMYTH, R.N., Vice-President, in the Chair.

Capt. F. Blackwood, R.N. of the Senior United Service Club, Pall Mall, was balloted for, and duly elected a Fellow of the Society.

FLORA.

Observations.

SOUTH VILLA. Equatoreal. (M.M. Bishop & Hind.)

1847.	Greenwich M.T. h m s	R.A. h m s	N.P.D. ° ′ ″
Oct. 18	11 40 4	5 3 39·23	75 56 28·2
	15 4 10	40·63	37·4
	15 52 27	41·09	38·3

These are the *first* Observations of *Flora*, the evening she was discovered. They were omitted by oversight in the last Notice.

CAMBRIDGE. (Professor Challis.)

1847.	Greenwich M.T. h m s	R.A. h m s	N.P.D. ° ′ ″	No. of Comp. R.A.	No. of Comp. N.P.D.	Star of Reference.
Nov. 15	11 53 15·4	4 53 33·46	76 13 32·9	4	4	B.A.C. 1542
	55 55·6	33·15	30·6	10	7	*a*
16	13 10 18·6	52 36·50	13 15·6	Meridian		
17	13 5 27·7	51 41·34	12 54·3	—		
18	13 0 35·5	50 44·90		—		
19	12 55 41·4	4 49 46·54	76 11 54·3	—		

"The equatoreal observations were taken with the Northumberland telescope. No correction is applied for parallax. The place of *a* was determined by two transit and two circle observations as follows:"—

1847 Nov. 15 Apparent R.A. = 4 h 53 m 46·34 s App. N.P.D. = 76 ° 18 ′ 45·9 ″

Elements.

By Mr. Hind.

"Six weeks' observations of *Flora* have sufficed for the determination of an orbit which I think will not require any material correction. From our observations of October 18, November 9, and December 5, I have calculated the following elements, taking account of all the small corrections, and employing the general method of Gauss, with some slight modifications for adaptation to this particular instance. The orbit is almost identical with that deduced by M. d'Arrest from the Berlin Meridian Observations up to November 17.

Epoch, 1848, January 0·0, Mean Time at Greenwich.

	°	′	″	
Mean Anomaly	35	39	1·87	
Longitude of Perihelion on the Orbit	32	48	44·95	M. Eq. 1848·0
Ascending Node	110	19	6·21	M. Eq. 1848·0
Inclination	5	52	47·76	
Angle of Eccentricity	9	1	26·10	
Log. Semi-axis Major	0·3426076			
Mean Sidereal Daily Motion	1086″·66375			

"These elements represent the middle observation with an error of + 0″·9 in longitude and — 0″·1 in latitude.

"It appears, therefore, that the period of revolution of *Flora* (about $3\frac{1}{4}$ years), is considerably shorter than that of any other small planet. It is also less than that of Encke's Comet, which has hitherto taken the lead after *Mars*. The position of her orbit is favourable to Olbers' well-known idea with regard to the origin of this zone of planets, an hypothesis which is also countenanced by the elements of *Hebe* and *Astræa*.

"According to the latest and most accurate determinations of their elements, it appears probable that the small planets now have the following order with respect to mean distance from the sun: — *Flora*, *Iris*, *Vesta*, *Hebe*, *Astræa*, *Juno*, *Ceres*, *Pallas*.

"*Iris*, *Vesta*, and again *Ceres*, *Pallas*, are so close upon each other, that the effects of perturbations may alter their relation in order of mean distance. It will be remarked that the inclinations of three of the orbits of the newly discovered planets, viz. those of *Astræa*, *Iris*, and *Flora*, are nearly the same."

By M. d'Arrest.

1847, October 18, at 12^h M.T. at Berlin.

	°	′	″	
M	13	44	26·94	
ϖ	32	18	34·63	M. Eq. 1847·0
Ω	110	23	2·42	M. Eq. 1847·0
i	5	52	21·74	
φ	9	8	38·15	
μ	1084″·0800			
Log a	0·3433161			

From the Berlin Meridian Observations of Oct. 22, Nov. 2, and Nov. 17.

Ephemeris. For Greenwich Mean Midnight.

By Mr. Hind.

1847.	R.A. m s	N.P.D. ° ′ ″
Dec. 9	4 28 8·3	75 39 32
10	27 5·6	36 47
11	26 4·0	33 56
12	25 3·6	30 58
13	24 4·4	27 52
14	23 6·6	24 41
15	22 10·3	21 22
16	21 15·6	17 57
17	20 22·5	14 25
18	19 31·1	10 48
19	18 41·5	7 4
20	17 53·8	75 3 14
21	17 8·0	74 59 18
22	16 24·1	55 16
23	15 42·3	51 9
24	15 2·6	46 55
25	14 24·9	42 36
26	13 49·4	38 11
27	13 16·1	33 40
28	12 45·0	29 4
29	12 16·1	24 23
30	11 49·5	19 37
31	11 25·3	14 45
1848. Jan. 1	11 3·4	9 49
2	10 43·8	74 4 48
3	10 26·6	73 59 42
4	4 10 11·7	73 54 32

1848.	R.A. h m s	N.P.D. ° ′ ″
Jan. 5	4 9 59·2	73 49 17
6	9 49·1	43 58
7	9 41·4	38 35
8	9 36·1	33 8
9	9 33·2	27 37
10	9 32·6	22 2
11	9 34·4	16 24
12	9 38·5	10 42
13	9 45·0	73 4 57
14	9 53·7	72 59 9
15	10 4·7	53 18
16	10 18·0	47 25
17	10 33·5	41 29
18	10 51·2	35 31
19	11 11·1	29 31
20	11 33·2	23 29
21	11 57·4	17 25
22	12 23·7	11 20
23	12 52·1	72 5 13
24	13 22·5	71 59 5
25	13 54·9	52 55
26	14 29·4	46 45
27	15 5·8	40 34
28	15 44·1	34 22
29	16 24·3	28 10
30	17 6·5	21 57
31	17 50·5	15 44
Feb. 1	4 18 36·3	71 9 30

The ephemeris gives the position of *Flora* referred to the true equinox. The aberration has not been applied, but the correction due to aberration is subjoined below for every fourth day, with the value of 497″·8 × Δ and the horizontal parallax.

1847.	Corr. for Ab. R.A. s	Corr. for Ab. N.P.D. ″	497″·8 × Δ ″	Hor. Par. ″
Dec. 11	+0·33	+1·0	472·1	9·05
15	·31	1·1	480·0	8·91
19	·28	1·3	489·6	8·73
23	·24	1·5	501·0	8·53
27	·19	1·6	514·0	8·31
31	·14	1·8	528·5	8·09
1848. Jan. 4	+0·08	+2·0	544·5	7·85

1848.	Corr. for Ab. R.A. s	Corr. for Ab. N.P.D. ″	497″·8 × Δ ″	Hor. Par. ″
Jan. 8	+0·03	+2·1	561·8	7·61
12	−0·04	2·3	580·2	7·37
16	·10	2·5	599·7	7·13
20	·17	2·6	620·2	6·88
24	·23	2·7	641·5	6·66
28	·30	2·9	663·6	6·44
Feb. 1	−0·36	+3·0	686·3	6·23

HEBE.

Observations.

CAMBRIDGE. Northumberland Equatoreal. (Prof. Challis.)

1847.	Greenwich M.T. h m s	R.A. h m s	N.P.D. ° ′ ″	No. of Comp. R.A.	No. of Comp. N.P.D.	Star of Reference.
Sept. 22	8 1 49·3	17 26 40·08	105 9 14·6	9	9	B.A.C. 5949
25	7 33 32·6	30 22·23	31 31·9	10	10	— 5948
27	7 51 55·8	17 32 58·34	105 46 9·9	10	10	— 5984
Oct. 20	6 38 55·6	18 7 23·62	108 6 24·7	6	6	H.C. 33588
21	6 51 42·4	9 5·13	108 11 19·0	7	4	— —
Nov. 2	5 59 3·4	30 9·66	109 1 12·5	8	8	B.A.C. 6333
10	5 45 1·0	18 45 9·81	25 10·6	1	1	— 6376
18	5 34 44·1	19 0 49·41	40 58·1	10	10	— 6536
19	5 27 34·9	2 48·56	42 20·4	6	6	— —
23	5 21 56·1	10 52·48	46 38·5	5	5	B.A.C. 6616
	24 24·4	10 53·06	46 36·9	3	3	— 6584
24	5 21 19·5	12 54·78	47 27·0	8	6	— 6616
29	5 49 41·1	19 23 15·76	109 49 9·2	5	2	H.C. 36857

"The observations have been corrected for refraction, but not for parallax. The places of the stars are adopted from the catalogues cited, regard being paid to secular variations."

MAKERSTOUN. Equatoreal. (Sir T. M. Brisbane.)

1847.	Makerstoun M.T. h m s	R.A. h m s	N.P.D. ° ′ ″	No. Obs.	Star of Comparison.
July 14	10 59 44	17 1 3·83		14	Weisse, xvi. 1158
	11 13 2		95 9 12·9	11	—— —
17	11 3 34	16 59 26·32	31 21·4	10	*a*
20	11 25 1	57 58·60	95 55 14·0	1	B.A.C. 5688
26	10 47 31	55 54·47	96 44 34·4	10	Weisse, xvi. 1004
31	9 55 4	54 58·22	97 27 29·3	6	—— 1067
Aug. 2	9 36 11	54 47·92	45 2·0	7	—— 975
3	9 33 27	54 45·18	97 53 56·8	5	—— —
7	9 52 38	54 52·82	98 29 58·8	3	*b*
10	9 58 58	55 15·66	98 57 21·2	10	Weisse, xvi. 1048
13	9 14 42	55 54·29	99 24 51·2	9	*c*
18	9 18 32	57 34·39	100 10 21·4	10	Weisse, xvii. 3
19	8 58 38	16 57 59·01	100 19 23·9	10	—— —

"The mean places of stars *a*, *b*, and *c*, for 1847·0, are assumed to be

	Mag.	h m s	° ′ ″
a	8·9	16 56 49·00	95 22 40
b	8	50 36·00	98 22 50
c	8	16 56 56·00	99 25 10

and the corresponding places of the planet are computed on this assumption."

IRIS.

Observations

CAMBRIDGE. (Professor Challis.)

1847.	Greenwich M.T. h m s	R.A. h m s	N.P.D. ° ′ ″	No. of Comp. R.A.	No. of Comp. N.P.D.	Star.
Sept. 10	10 16 40·3	19 43 35·49	104 14 9·6	8	8	Bessel, xix. 1068
11	10 34 35·9	43 34·11	15 13·8	6	6	—— —
14	8 10 35·9	43 41·73	18 23·1	Meridian		
17	10 31 5·0	44 9·20	21 12·2	6	6	Bessel, xix. 1068
18	7 55 4·6		21 48·7	Meridian		
22	40 58·5	45 31·85	24 1·4	—		
24	33 53·6	46 18·88	24 55·6	—		
25	30 24·1	46 45·33	25 7·2	—		
27	7 23 29·5	47 42·77	25 26·5	—		
Oct. 7	6 50 49·2	54 22·58	22 10·9	—		
12	35 31·7	58 45·34	17 19·4	—		
13	32 33·6	19 59 43·35	16 1·7	—		
19	15 10·1	20 5 56·29	6 27·0	—		(N.P.D. uncertain.)
20	12 20·7	7 2·95	4 27·5	—		
21	6 9 33·5	8 11·89	104 2 22·0	—		
25	5 58 36·6	12 59·37	103 47 43·7	—		
26	5 55 55·3	14 14·19		—		
Nov. 2	6 41 0·6	23 35·51	103 29 12·8	6	6	Bessel, xx. 545
17	8 42 17·7	46 32·12	102 24 36·2	2	2	B.A.C. 7242
18	7 14 10·1	48 4·11	19 33·6	8	8	— —
19	6 9 41·1	49 38·83	102 14 27·6	2	2	— —
23	7 33 47·8	20 56 28·70	101 51 22·7	5	1	— 7296
Dec. 1	6 42 32·2	21 10 28·38	101 0 58·3	7	7	Bessel, xxi. 184

"The observations not on the meridian were taken with the Northumberland equatoreal. No correction has been applied for parallax. The places of the stars are adopted from the cited catalogues, with the exception of Bessel, xix. 1068; the mean place of which, 1847·0, was found by one transit and one circle observation to be,

$$\text{R.A.} = 19^h\,41^m\,50^s{\cdot}40,\quad \text{N.P.D.} = 104^\circ\,18'\,14''{\cdot}1,$$

differing considerably in R.A. from Bessel's place."

MAKERSTOUN. Equatoreal. (Sir T. M. Brisbane.)

	Makerstoun M.T. h m s	R.A. h m s	N.P.D. ° ′ ″	No. of Comp.	Star of Comp.
Sept. 10	9 20 40	19 43 35·48	104 14 17·0	10	B.A.C. 6776
13	8 14 0	43 37·03	17 32·5	9	— —
14	8 11 0	19 43 41·67	104 18 31·8	12	— —

The Makerstoun equatoreal is by Messrs. Troughton and Simms; the focal length of the telescope is 8½ feet; the object glass, a very fine one by Merz, has 6 inches aperture. The observations are made with a wire micrometer; power 95. The Makerstoun observations are corrected for refraction, but not for parallax.

Ephemeris. For 6^h Greenwich Mean Time.

By Mr. Hind, from M. d'Arrest's Second Elements.

1847.	R.A. h m s	N.P.D. ° ′ ″	1848.	R.A. h m s	N.P.D. ° ′ ″
Dec. 24	21 53 52·1	97 54 32	Jan. 7	22 22 12·2	95 33 14
25	55 51·2	45 6	8	24 16·2	22 26
26	57 50·6	35 33	9	26 20·4	11 32
27	21 59 50·5	25 54	10	28 25·0	95 0 33
28	22 1 50·7	16 9	11	30 29·8	94 49 28
29	3 51·3	97 6 18	12	32 34·9	38 19
30	5 52·3	96 56 21	13	34 40·3	27 4
31	7 53·6	46 18	14	36 46·0	15 44
1848.					
Jan. 1	9 55·2	36 9	15	38 51·9	94 4 20
2	11 57·2	25 54	16	40 58·1	93 52 51
3	13 59·5	15 34	17	43 4·5	41 17
4	16 2·2	96 5 7	18	45 11·2	29 38
5	18 5·2	95 54 35	19	47 18·1	17 55
6	22 20 8·5	95 43 57	20	22 49 25·3	93 6 7

The correction for aberration is not applied in the ephemeris, but may be taken from the table subjoined and added to the ephemeris.

	Corr. for Aberr. R.A.	Corr. for Aberr. N.P.D.	497″·8 × Δ	Hor. Par.		Corr. for Aberr. R.A.	Corr. for Aberr. N.P.D.	497″·8 × Δ	Hor. Par.
	s	″	m s	″		s	″	m s	″
Dec. 24	−1·61	+7·6	19 27·8	3·66	Jan. 9	−1·76	+9·3	20 21·2	3·50
28	1·65	8·0	19 41·8	3·61	13	1·79	9·7	20 33·5	3·46
Jan. 1	1·68	8·5	19 55·4	3·57	17	1·83	10·0	20 45·4	3·43
5	−1·72	+8·9	20 8·5	3·53	21	−1·87	+10·3	20 56·9	3·40

NEPTUNE.

Observations.

CAMBRIDGE. In the Meridian. (Professor Challis.)

Compared with Mr. Adams's Ephemeris.

1847.	Greenwich M.T. h m s	R.A. h m s	Obs^d—Calc^d. s	N.P.D. ° ′ ″	Obs^d—Calc^d. ″
Sept. 24	9 49 16·6	22 2 4·16	−0·52	102 41 36·6	+0·2
25	45 15·8	1 59·19	·51	42 4·8	1·5
27	9 37 13·9	22 1 49·08	−0·91	102 42 57·4	+1·8

1847.	Greenwich M.T. h m s	R.A. h m s	Obs^{d}—Calc^{d}. s	N.P.D. ° ′ ″	Obs^{d}—Calc^{d}. ″
Oct. 6	9 1 11·6	22 1 9·85	—0·57	102 46 28·9	+1·4
7	8 57 11·7	1 5·84	·64	46 48·4	0·0
11	41 13·1	0 50·80	·87	48 7·7	1·2
12	37 13·9	0 47·51	·81	48 25·6	1·0
19	9 21·6	0 26·52	·89	50 17·2	3·1
20	5 23·1	0 23·95	·92	50 29·5	2·1
21	8 1 24·8	0 21·49	·97	50 43·3	3·4
25	7 45 32·9	0 13·27	·70	51 27·5	4·1
26	41 35·2	0 11·43	·72	51 35·9	3·2
Nov. 1	17 51·4	0 3·10	·71	52 16·4	2·2
2	7 13 54·6	22 0 2·18	·67	52 22·3	3·6
10	6 42 24·1	21 59 58·96	·94	52 33·2	3·7
15	22 47·1	22 0 1·49	0·84	52 17·5	4·1
16	18 51·7	0 1·99	(1·21)	52 15·5	(7·5)
18	11 2·4			52 1·0	5·9
19	6 7 7·8	22 0 5·80	—0·83	102 51 51·1	+3·5

"The parallax 0″·3 is taken account of. On Nov. 16 the observations were very uncertain, the planet being nearly hid by clouds."

MAKERSTOUN. Equatoreal. (Sir T. M. Brisbane.)

1847.	Makerstoun M.T. h m	R.A. h m s	N.P.D. ° ′ ″	No. of Comp.	Star of Comp.
July 14	12 11	22 8 59·32	102 2 58·8	2	B.A.C. 7821
Aug. 2	10 51	7 20·32	12 25·0	6	— 7722
7	11 10	6 50·55	15 14·6	8	
22	12 16	5 17·32	23 59·3	7	
Sept. 4	10 59	3 56·78		8	
	11 0	3 56·65		15	— 7747
	11 10		31 26·9	3	— 7722
	11 25		31 24·2	7	— 7747
6	10 34	3 44·62	32 30·0	11	— —
13	8 58	3 3·68	36 13·2	7	— —
Oct. 25	8 25	0 12·95	51 28·1	5	— —
27	7 0	0 9·70	51 45·1	7	— —
28	6 40	0 8·15	51 54·0	10	— —
29	7 40	22 0 6·50	51 59·1	1	— —
Nov. 8	7 50	21 59 59·04	52 35·1	8	— —
9	7 55	59 59·01	52 34·6	8	— —
12	7 43	21 59 59·70	52 28·6	3	— —
16	7 47	22 0 2·56	52 11·6	10	— —
17	8 15	0 3·39	52 5·6	4	— —
19	7 43	0 5·80	51 49·9	7	— —
Dec. 3	6 47	22 0 37·65	102 48 52·1	6	— —

All the observations have been corrected for refraction.

Ephemeris. By Mr. Adams.

Greenwich Mean Midnight.

1847.	R.A. h m s	N.P.D. ° ′ ″	1848.	R.A. h m s	N.P.D. ° ′ ″
Dec. 12	22 1 12·85	102 45 37·1	Jan. 6	22 3 34·22	102 32 42·5
13	17·21	45 13·1	7	41·13	32 4·8
14	21·69	44 48·4	8	48·12	31 26·6
15	26·28	44 23·1	9	3 55·20	30 48·0
16	30·99	43 57·2	10	4 2·35	30 9·0
17	35·81	43 30·7	11	9·58	29 29·5
18	40·75	43 3·6	12	16·88	28 49·7
19	45·80	42 35·9	13	24·26	28 9·4
20	50·96	42 7·5	14	31·70	27 28·8
21	1 56·23	41 38·7	15	39·22	26 47·8
22	2 1·60	41 9·3	16	46·80	26 6·4
23	7·08	40 39·2	17	4 54·45	25 24·7
24	12·67	40 8·6	18	5 2·17	24 42·6
25	18·36	39 37·4	19	9·94	24 0·2
26	24·15	39 5·7	20	17·78	23 17·5
27	30·05	38 33·4	21	25·67	22 34·4
28	36·04	38 0·6	22	33·62	21 51·0
29	42·13	37 27·3	23	41·62	21 7·4
30	48·32	36 53·4	24	49·68	20 23·4
31	2 54·60	36 19·1	25	57·79	19 39·2
1848.			26	6 5·95	18 54·7
Jan. 1	3 0·98	35 44·2	27	14·15	18 9·9
2	7·45	35 8·8	28	22·41	17 24·9
3	14·01	34 33·0	29	30·70	16 39·7
4	20·66	33 56·6	30	39·04	15 54·2
5	22 3 27·40	102 33 19·8	31	22 6 47·43	102 15 8·5

Horizontal Parallax = 0″·28.

Sweeping Ephemeris for the expected Comet of 1264 *and* 1556

From Mr. Hind's Tables in the *M. Notice* for April 1847, p. 264.

1848.	P.P. Feb. 10. R.A. h m	N.P.D. ° ′	P.P. March 11. R.A. h m	N.P.D. ° ′	P.P. April 10. R.A. h m	N.P.D. ° ′
Jan. 1	15 23	105 24	13 37	105 58		
11	16 31	105 14	14 18	107 15	12 44	106 41
21	17 49	103 40	15 12	107 52	13 7	108 2
31	19 12	100 53	16 23	107 5	13 38	109 13
Feb. 10	20 33	97 56	17 50	103 59	14 22	109 54
20	21 46	95 31	19 20	98 54	15 32	109 3

As the Comet is expected to appear very shortly, if at all, observers are particularly requested to be on the look-out for it.

MISS MITCHELL'S COMET.

Observations.

CAMBRIDGE. Northumberland Equatoreal. (Prof. Challis.)

1847.	Greenwich M.T. h m s	R.A. h m s	N.P.D. ° ′ ″	No. of Comp.	Star of Reference.
Oct. 11	7 42 20·7	16 33 8·19	51 17 35·5	3	*η Herculis*
	8 58 57·3	32 50·90	48 15·1	4	Bessel Z. 421, $16^h\ 34^m\ 2^s$
12	7 55 5·8	16 28 19·57	60 57 46·2	4	—— 367, 16 29 51
	8 0 10·0	28 18·14	59 54·1	6	—— 367, 16 25 34

Elements.

By Mr. Rümker.

Perihelion Passage, Nov. 14·418558, Greenwich M.T.

	° ′ ″	
Longitude Perihelion	274 23 38·6	Eq. Oct. 11.
Ascending Node...	190 51 40·8	
Inclination	71 57 45·9	
Log q	9·51875966	Motion Retrograde.

From the Roman observation of Oct. 3, and the Hamburg observations of Oct. 11 and 17.

By Mr. N. Pogson.

T 1847, Nov. 14·40316, Greenwich M.T.

	° ′ ″	
π	274 10 57·8	M. Eq. 1847·0.
Ω	190 50 21·0	
i	71 49 36·5	
Log q	9·516912	Motion Retrograde.

"The errors at the time of the second observation are,—

In Longitude $+34''\cdot5$ In Latitude $+49''\cdot2$

From observations by the Rev. W. R. Dawes on Oct. 7, 11, and 17, all the small corrections being taken into account."

Ephemeris.

By Mr. George Rümker.

For Greenwich Mean Midnight.

	R.A. ° ′	Decl. ° ′		R.A. ° ′	Decl. ° ′
Dec. 10·5	227 37	−9 55	Dec. 22·5	230 38	−0 3
12·5	228 7	8 15	24·5	231 8	+1 35
14·5	228 36	6 35	26·5	231 38	3 14
16·5	229 6	4 57	28·5	232 8	4 53
18·5	229 37	3 18	30·5	232 37	+6 32
20·5	230 7	−1 41			

COLLA'S COMET.

Observations.

CAMBRIDGE. Northumberland Equatoreal. (Prof. Challis.)

1847.	Greenwich M.T. h m s	R.A. h m s	N.P.D. ° ′ ″	Weight.	Reference Stars.
Nov. 24	6 16 11·6	17 34 31·86	31 9 45·0	1	B.A.C. 5918, Arg. Z. 117; 90
29	8 15 6·9	17 57 13·64	31 41 31·4	4	Arg. Z. 117; 113, 120
Dec. 5	6 48 28·1	18 22 38·12	32 24 36·2	8	45 *Draconis* Arg. Z. 20; 15
6	6 42 57·9	18 26 47·08	32 32 31·1	2	45 *Draconis*
8	7 5 52·8	18 35 1·03	32 48 51·6	6	Arg. Z. 20; 28

"These places are corrected for parallax by Littrow's ephemeris. The comet was of the last degree of faintness, and observations of it were obtained with great difficulty.

"On Nov. 24, Dec. 5, and Dec. 6, the comet was referred to a single small star in its immediate neighbourhood by measures of differences of north polar distance and angles of position: on the other two days it was referred to *two* small stars by angles of position only. The stars of immediate reference were subsequently compared with those named above. Where two are mentioned, it is to be understood that the position of the comet depends on both *equally*. The weights assigned to the several positions are estimated from a consideration of the number of measures and all the circumstances of the observations. On Nov. 24 the observations were interrupted by the rising of the moon. On Dec. 6 the comet could not for a considerable time be detected on account of its being very near a star of the 10th magnitude, with which, after emerging from its rays, it was compared by a measure of difference of north polar distance and an estimated angle of position. On Dec. 5 I was able to use a power of 240. All the measures were taken with the instrument carried by clock movement, the faintness of the object making this precaution necessary."

STARFIELD. 20-foot Reflector. (Mr. Lassell.)

1847.	Greenwich M.T. h m s	Comet—Star. R.A. m s	N.P.D. ′ ″	No. Obs.	Star of Comparison.
Nov. 23	6 40 26		+1 57·9	8	
	6 52 30	+0 33·30		3	
Dec. 1	8 11 29	−0 19·90		16	Arg. Z. 117; 128
	8 47 55		−6 54·7	16	
	9 20 53	−0 7·64		9	
14	8 41 36		−2 9·3	5	Star compd with Arg. Z. 38; 2
	9 7 13	+0 15·80		7	= —— 130; 102
	9 31 46		−1 51·3	4	
	10 25 19	+0 28·60		4	

"On Nov. 23 the star of comparison was one of (8·9) magnitude, which precedes another of (7·8) magnitude $1^m\,51^s{\cdot}7$ in right ascen-

sion, and is 3′ 46″ to the north of it. The approximate apparent place of the second star is "

R.A. $17^h\ 31^m\ 31^s$ N.P.D. 31° 7′ 10″

Adopting Argelander's places, and correcting the observations for parallax, the following positions of the Comet have been deduced:

1847.	G.M.T. h m s	R.A. h m s	N.P.D. ° ′ ″
Dec. 1	8 46 10	18 6 1·03	31 55 34·7
14	9 26 30	18 59 7·83	33 41 14·1

ANNULAR ECLIPSE OF OCT. 8–9, 1847.

Captain Jacob writes that "the eclipse was observed at Bombay,

	Bombay M.T. h m s
Eclipse begins	1 7 36
Annulus forms	2 53 43
breaks	3 1 15·5
Eclipse ends	4 28 6

"From the place of observation the lighthouse bears S. 18° 40′ W., and Malabar Point flagstaff, S. 88° 55′ W.: these two are points in the trigonometrical survey; but I have not the survey data, with the exception of the latitude, 18° 53′ 40″, and longitude, 72° 51′ 12″ of the lighthouse. From these and a good map of Bombay, I get for my position, latitude, 18° 56′ 14″, and longitude, 72° 52′ 07″. The survey longitudes are believed to be erroneous in defect rather more than 1′. The bearings were determined by measurement with a pocket sextant from the setting sun, and are probably within 2′ of the truth. The times of the beginning and end of the eclipse are uncertain; the former to 4^s or 5^s, the eye having been withdrawn from the telescope at the moment; the latter to 2^s or 3^s from the sun's limb being tremulous. The times of the annular phase were considered exact, and the resulting longitude of the place comes out $\left\{\begin{matrix}4^h\ 51^m\ 37^s{\cdot}5\\ 37\cdot8\end{matrix}\right\}$ or $\left\{\begin{matrix}72^\circ\ 54'\ 22''\\ 27\end{matrix}\right\}$ from these two times.

"The day was remarkably clear for the season, not a cloud having passed until near the end of the eclipse. Shortly before the annular phase, a faint ray or brush of light was seen issuing from the sun's northern cusp, which soon after extended in both directions as a tangent to the sun's limb: nothing of the kind was visible at the other cusp; possibly it arose from a passing film of vapour.

"When the annulus was about forming, the first thing noticed was the light running rapidly round on the south side, leaving a break of considerable extent, which seemed to arise from a projecting table-land in the moon. This was soon withdrawn, and at the same instant a kind of ligament, or stalk, of about 1′ in breadth, was seen attaching the moon's limb to that of the sun, which was now quite clear, this small spot only excepted; the moon's limb was also perfectly well defined except in this point. The ligament

lasted for 3^s or 4^s,—perhaps more, elongating as the moon advanced, and was at length suddenly retracted into her circumference, the end appearing broken or toothed. At the breaking of the annulus the phenomenon was different; the moon's limb continued to approach that of the sun, till, when very close, a portion of the former, about 30° in extent, suddenly flowed over in dark lines, with bright spaces between, which almost immediately vanished, the whole appearance not lasting above 2^s. The first appearance was like that shewn in Pl. I. Fig. 10 of the Society's *Memoirs*, vol. x., and the last more resembled Figs. 1 and 3 of the same plate, but the lines were more numerous though they could not be counted. The telescope used was a $3\frac{1}{2}$-foot by Dollond, with a power of 40.

"Not being in good health, I was unable to make any further observations of importance, except that the temperature of the air fell during the eclipse from 87° to 84°·5, and rose again to 85°·5 at the termination; and that, while the annulus lasted, the sun's rays had scarcely a perceptible effect on the thermometer.

"The time of the retraction of the ligament was noted as that of the formation of the annulus; and the time when the lines began to run across as the time of the end of the same. No light could be seen round the moon's limb when *off* the sun, either before or after the annulus."

BEADS IN ANNULAR ECLIPSES.

By the Rev. Professor Baden Powell.

The author considers the fact of the existence of the phenomenon in question as sufficiently well established, notwithstanding the equally admitted discrepancies in the accounts given of the appearance of the beads by different observers. Observers differ as to such points as the stationary or fluctuating character of the beads and the degree of their changes into threads; and they have sometimes been seen by one observer and not by another when the circumstances have been in some degree different. These discrepancies the author thinks due in some cases to the different coloured glasses employed, and in others to the loss of light, as, for example, when the images are projected on a screen. He thinks Mr. Caldecott's explanation of the tremulousness of the beads (as being due to atmospheric mirage) unsatisfactory, and is rather inclined with Mr. Airy to attribute it, in part, to the rapid decrease of the intensity of the sun's light near the borders.

The author considers the whole of the phenomena that have been observed to be due to two causes, viz. to the rapid decrease of light at the sun's edge, and to the acknowledged law of irradiation, that it increases with the increase of the intensity of the light.

This being allowed, he imagines that "any small opening or notch on the moon's edge will give rise to an enlarged image or patch of light by irradiation; and that this will be *much greater* as

the part occasioning it is further advanced on the sun's disk," thus the formation of *beads* is accounted for, and their elongation.

"Again, when the junction is broken, the same causes will account for the *widening* of the separation, and that in a *greater degree towards the sides* which are more remote from the circumference."

The author then proceeds to illustrate his explanation by means of diagrams applying to the different phases of the phenomenon; and he considers the principles laid down in explanation to possess the character of a "*vera causa*," though they may not suffice to explain all the phenomena.

Differences in the appearances of the beads as described by different observers must also be expected, both from the preceding theory, and from the circumstance that there are differences in the *power* and *aperture* of the *telescopes* employed; the author hopes shortly to be able to offer to the Society some contributions towards the better elucidation of this subject.

It is perhaps questionable whether the same principles will afford an explanation of certain apparently analogous phenomena observed in the transits of *Venus;* but, in general, the adherence of the planet to the limb of the sun by a neck at the point of junction, and the protuberance of the disk towards the same part of the separation, are appearances which agree sufficiently with the cause above assigned.

In a note appended to Professor Powell's paper, he alludes to the observations of the eclipse of October 9 of the present year, in which small beads were observed, with waving in the limb, but without increase, or elongations of the shadows into threads, or any other change. In the case of M. Schaub's observations, the complementary combination employed might, by the loss of light, have destroyed any effects of irradiation. Also, as the ring formed was very thin, the difference of the intensities of the sun's light for the breadth of the band would be very small; and thus the causes above referred to might not act to a perceptible extent: the whole of the phenomena might be simply accounted for, as M. Mauvais observes, by the mere consideration of the irregularities of the moon's limb as it just touched that of the sun.

Results deduced from the Occultations of Stars and Planets by the Moon. Observed at Cambridge Observatory from 1830 *to* 1835. By the Astronomer Royal.

These occultations were reduced at the time in the most complete manner which was then practicable. A very approximate place of the star having been assumed, the apparent place of the point of the moon's limb at which the occultation took place was known, and by the application of the proper correction for parallax, the geocentric place of the same point for the instant of occultation was also known. The geocentric place of the moon's centre was

computed for the instant of occultation, according to the Lunar Tables. From the spherical co-ordinates of these two points, their distance was computed, which ought to be equal to the tabular semidiameter of the moon. Any discordance must arise from some of the following sources,—an error in the assumed R.A. or N.P.D. of the star, an error in the tabular R.A. or N.P.D. of the moon, an error in her parallax or semidiameter, or in the time of observation. The effects of errors of all these kinds (except that of the moon's semidiameter), upon the computed distance between the moon's centre and the point on her limb, were calculated and expressed symbolically; and, finally, the computed distance, with the addition of these symbolical terms, was made absolutely equal to the tabular diameter, with the addition of a symbolical term: thus the final equation contains one numerical term derived from the observation, and seven symbolical terms. This is essentially the simplest and most complete result which can be derived from the observation of an occultation; and if the numerical values of any one of the symbols shall become known, such symbols may, by numerical substitution, be removed from the equation.

The equations, in the form just described, are published in the various volumes of the Cambridge Observations from 1830 to 1835.

The form can now be simplified for the following reasons:—

1st. The stars have been carefully determined, hence the symbols for their errors in R.A. and N.P.D. can be got rid of in all cases. The same may be said, with few exceptions, of the places of the occulted planets.

2nd. Mr. Henderson's investigation of the value of the Horizontal Parallax of the Moon (*Mem. Roy. Ast. Soc.*, vol. x.) enables us to remove the corresponding symbol.

3rd. An error had been committed in the computation of the symbolical factor respecting the correction to be made to the time of observation. The change in the place of the moon's centre had been correctly computed, but the change in the correction for parallax, consequent on a change in the hour angle depending on a correction for time, had been omitted. The equations are now cleared of this fault.

To facilitate the application of the results to Lunar theories, the form of the equations has been changed; and they now depend on errors of Longitude and Ecliptic North Polar Distance, and not on errors of R.A. and N.P.D.

It was not thought advisable to introduce into the equations the numerical correction of the moon's semidiameter, as deduced from transit and circle observations, as it would be hazardous to assume that this semidiameter is necessarily the same as the semidiameter of the opake body behind which the occultations occur.

To the year 1833 inclusive, the Lunar Elements are computed from the *Berliner Jahrbuch*: for 1834 and 1835, they are derived from the *Nautical Almanac*. The computations have been partly made by Mr. Glaisher, partly by Mr. H. Breen, jun.; and the

Astronomer Royal places great reliance on the accuracy of the results.

The Memoir is divided into Three Sections.

Sect. I. Places of the Occulted Stars adopted for computation.

Sect. II. Correction of the assumed value of Horizontal Parallax, and Correction of the Factor of the Error of Time, depending on the change of Parallax during the error of time.

Sect. III. Transformation of the final equations from the form depending on errors of the moon's place in R.A. and N.P.D. to a form depending on errors of the moon's place in Longitude and Ecliptic North Polar Distance: and exhibition of the final results.

Letter from the Rev. W. R. Dawes.

"On the first of last month, while tracing the southern limits of the great nebula in *Orion*, my attention was attracted by the appearance of the star which stands on the point of the *proboscis major*. With my $8\frac{1}{2}$-foot equatoreal, power 195, the star was distinctly separated into two, whose magnitudes were carefully estimated to be the eighth and ninth. I have since searched in vain for any notice of the duplicity of this star; yet it must have come under the eye of every observer who has scrutinised the ramifications of this most extraordinary of the nebulæ. In the map of the regions and stars of the nebulæ, presented by Sir John Herschel to the Astronomical Society in 1826, and contained in vol. ii. of the *Memoirs*, this star is inserted, and denominated *A*. The same designation is given to it in the catalogue of the stars in the nebula given by Sir John in page 28 of his *Results of Astronomical Observations made at the Cape*, in which it stands as No. 135. It is there called 6·7 magnitude, which is far brighter than it appears in *this* latitude: yet its identity is unquestionable. Though one of the most conspicuous stars in that part of the nebula, and inserted with perfect accuracy from micrometrical observations in the beautiful plate in Sir John's volume of *Results*, yet no intimation is given of its being double. Neither does it appear in the catalogue of Double Stars, observed with the 20-foot reflector. It seems scarcely probable that if, ten years ago, it presented its present appearance, it should not have been recognised under the power of the 20-foot reflector, and within 30° of the zenith. This would perhaps be more extraordinary than that it should have escaped detection by Mr. Cooper with his gigantic refractor, or by Dr. Lamont with the large telescope of $11\frac{1}{4}$ inches aperture at the Royal Observatory at Munich (whose observations of the nebula are specially referred to by Sir John Herschel), or by Struve at Dorpat, or finally by De Vico at Rome, who seems to have paid great attention to this

object, and in whose picture the star in question appears as of the eighth magnitude, which is also assigned to it by Lalande, in whose catalogue it stands as No. 10567. The unavoidable inference would seem to be that the star must have emerged from a single state within the last ten years. But if its change has been so rapid, it is surprising that it was never observed to be double *previously to its closing*, either by Struve in his sweeps for double stars, or by the scrutinising eye of Sir W. Herschel, who brought some of the largest and most perfect of telescopes to bear upon it. If, on the other hand, the star has always been as distinctly double as it is now, then it would be difficult to say what amount of non-observation may be received as conclusive evidence of non-existence. The object is, at any rate, one of peculiar interest; and I would earnestly request attention to it by such observers as possess instruments competent to its satisfactory measurement. Its mean place for 1848·0 is R.A. $5^h\ 28^m\ 27^s$; N.P.D. $95^\circ\ 43'\ 47''$."

The star Weiss xx, 122, supposed to be missing, is inserted in the Berlin Map, Hora xix, published in 1840.—(R. W. R.)

MONUMENT TO NEWTON.

An Obelisk, 64 feet high, has been erected by the Rev. Charles Turnor, in the park of Stoke Rochford, Lincolnshire, the residence of his nephew, Christopher Turnor, Esq. Newton, when a child, went to a little day-school at Stoke, which gives propriety to the site. The Inscription is as follows:—

IN MEMORY
OF
SIR ISAAC NEWTON,
WHO WAS BORN AT WOOLSTHORPE,
AN ADJOINING HAMLET,
AND
RECEIVED THE FIRST RUDIMENTS OF HIS EDUCATION
IN THE PARISH OF STOKE.

THIS OBELISK WAS ERECTED
BY
CHARLES TURNOR, M.A. F.R.S.
PREBENDARY OF LINCOLN,
A.D. MDCCCXLVII.

MAY THE INHABITANTS OF THE SURROUNDING DISTRICT
RECOLLECT WITH PRIDE THAT SO GREAT A PHILOSOPHER
DREW HIS FIRST BREATH IN THE IMMEDIATE NEIGHBOURHOOD
OF THIS SPOT;
AND MAY SUCH FEELINGS LONG BE PERPETUATED
BY THIS MONUMENT,
WHICH RECORDS THE VENERATION OF POSTERITY
FOR THE MEMORY
OF THAT ILLUSTRIOUS MAN.

Printed by George Barclay, Castle Street, Leicester Square.